

**TITLE:**

Santa Barbara Catch Basin Inlet Storm Drain Screens Project

**DATE:** December 2011

**WATERSHEDS:**

Cieneguitas Creek, Arroyo Burro, Mesa Creek, Honda Valley Creek, Mission Creek, Laguna Creek, Sycamore Creek, Andree Clark Bird Refuge, and Montecito Creek Watersheds, Santa Barbara, California

**PROJECT TYPE:**

Storm Water Quality Improvement

**FUNDING SOURCES:**

Clean Water State Revolving Fund (ARRA)

**PROJECT COST:**       \$2,143,148

**Submitted by the City of Santa Barbara**

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## **I. Executive Summary**

The City of Santa Barbara Creeks Restoration/Clean Water Division received a Clean Water State Revolving Fund (CWSRF) Grant through the American Recovery and Reinvestment Act of 2009 in the amount of \$1,789,388 to install stainless steel retractable screens at each catch basin opening on the curb face between the street gutters and City sidewalks.

The main goals of the Storm Drain Screens Project are to improve water quality, and increase community awareness about water pollution. The project is located throughout the City of Santa Barbara at the opening of catch basin storm drain inlets. The screen design was developed over the course of several years, through a series of pilot studies, with input from engineers, and storm water staff. The City's Creeks Advisory Committee, elected officials, and other community members also provided valuable input during the design phase.

Construction took place from 2009 through 2011. The CWSRF grant was specifically used to manufacture and install the storm drain screens in the catch basins throughout the City.

Monitoring has revealed a reduction in trash in the catch basins and in the creeks since the screens were installed.

The City of Santa Barbara will continue to maintain the storm drain screens so that they are effective in reducing the amount of trash entering the storm drain system.

## **II. Problem Statement & Relevant Issues**

Trash, debris, and other floating, suspended, and settleable materials known as gross pollutants are an ongoing water quality problem that adversely affects the beneficial uses of City creeks, estuaries, and coastal waters. Gross pollutants deposited on streets and sidewalks often settle into storm drain catch basins and remain there until they are carried by stormwater into surface waters. Trash, debris, and floatables are pollutants of concern that the City Storm Water Management Program aims to control. The City Creek Inventory and Assessment Study of 2000 identified trash as one of the factors contributing to poor water quality in City creeks. During the 2004 public forums hosted by the Creeks Division, trash in the creeks was one of the concerns raised by the participating public. In an April 2008 Water Quality Assessment Meeting the Central Coast Regional Water Quality Control Board identified trash as one of the top water pollutants in the City.

## **III. Project Goals**

- A.** The goal of this project is to eliminate the trash and debris transferred from the streets to the storm drains and creeks.
- B.** The Desired Outcomes of this project are:
  - i.* Reduce the amount of trash in the storm drain catch basin inlets.
  - ii.* Reduce the amount of trash in the creeks

## IV. Project Description

### A. Project Type CWSRF Principal Forgiveness (ARRA Grant)

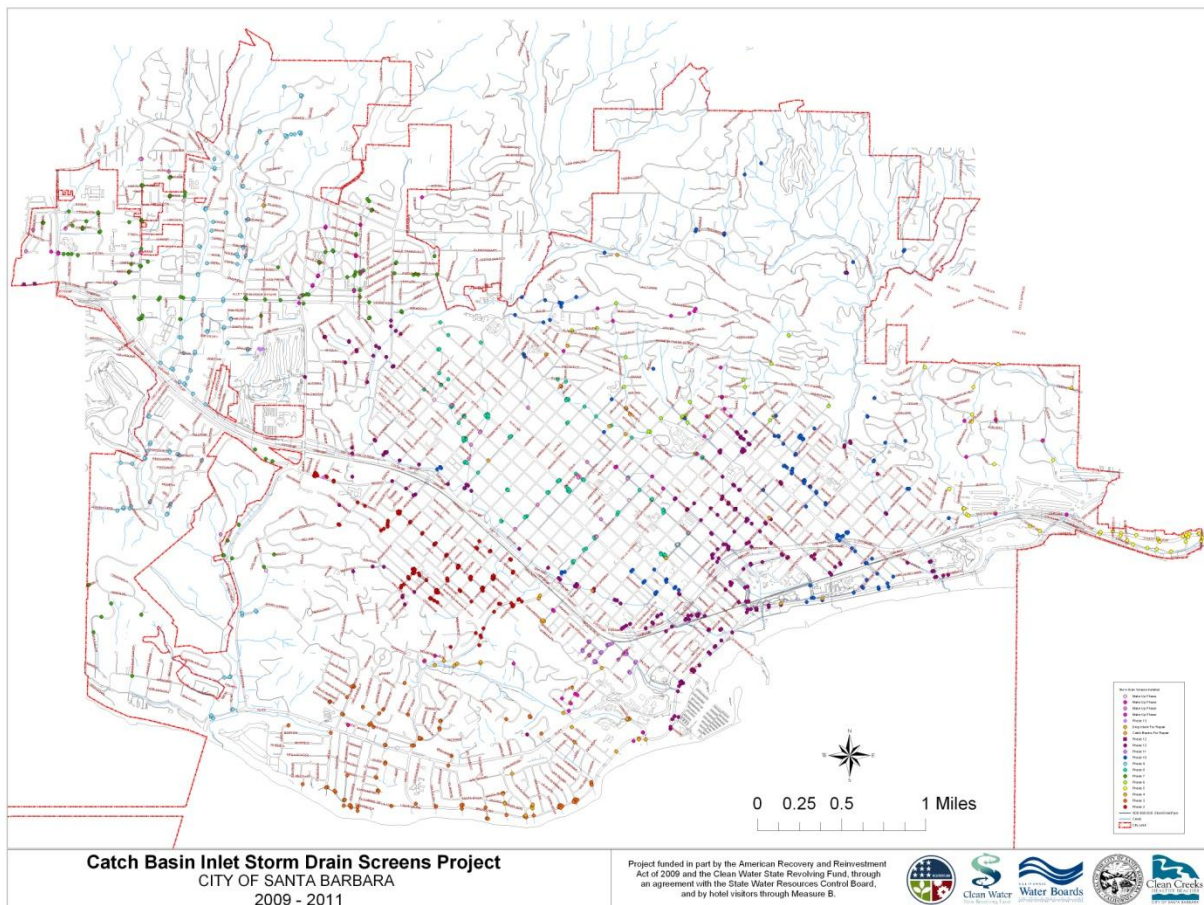
### B. Project Costs

CWSRF-ARRA	\$1,789,388
City of Santa Barbara	\$ 353,760
TOTAL	\$2,143,148

### C. Project Description/Methodology/Construction

The Project, commonly known as Santa Barbara Catch Basin Inlet Storm Drain Screens Project, generally consisted of installing stainless steel retractable screens at each catch basin opening on the curb face between the street gutters and City sidewalks to keep trash from entering the storm drains, creeks, estuaries, and ocean. Due to Project design and the use of high quality construction materials, the storm drain screens will require minimal ongoing maintenance.

The project began in June 2009. A list of a portion of storm drain catch basins was given to the contractor along with maps showing the locations. The contractor visited each catch basin, measured the dimensions of the opening, and determined if a storm drain screen could be made to fit the opening. The dimensions for each eligible catch basin opening were given to the manufacturer in Los Angeles, California, where American made stainless steel sheet metal was cut and shaped to form storm drain screens. The manufacturer custom fit each storm drain screen to its corresponding catch basin opening. The finished screens were then brought back to Santa Barbara and installed in the catch basins. Each installed storm drain screen was inspected by City staff to ensure that it met the specified tolerances outlined in the contract. If any screens were determined to be out of specification, the contractor revisited the site to modify or replace the screen. Once all screens were properly installed, the City paid the contractor for that portion of installations. Because of the large amount of storm drain catch basins in the City, they were divided into geographic portions, or phases, to minimize construction impacts, and to make project tracking more efficient. All phases were completed by the end of June 2011.



**Figure 1.** Project Map with Installed Catch Basin Screen Locations. Different colors represent different phases of installs during project construction.

#### D. Data Evaluation/Pollutant Reduction

The primary goal of monitoring the Storm Drain Screens Project was to determine if trash amounts in the storm drains and creeks were diminished after the project was constructed. Two different forms of data were collected before and after project construction to evaluate the effectiveness of the project in reducing trash: 1) Creek trash surveys, and 2) Catch basin box trash surveys.

##### 1) Creek Trash Surveys

Detailed surveys of trash in Lower Mission Creek and Old Mission Creek took place during the summer of 2007, 2008, and 2009 to provide a baseline for measuring the effectiveness of storm drain screens in preventing trash from entering the creek. A detailed description of the data collection methods follows:

City staff walked the entire length of Old Mission Creek from the upstream end of the railroad culvert near West Figueroa Street up to the downstream end of the storm drain under San

Pascual Street (including the Westside Drain tributary at the downstream end of West Victoria St. at San Andres Street). This walk had two goals:

- To walk the section of creek as part of our regular summer Creek Walk effort, identifying any unusual issues or problems in the creek.
- To quantify and categorize the trash found in this section of creek, to help evaluate the effectiveness of the catch basin screen installations. After the screens are installed, this type of walk will be repeated to compare the quantity and type of trash found before and after the project.

Initially we had planned to use the GPS unit to record trash, using the same method used for past Creek Walks. The heavy canopy cover made it very difficult to use the GPS. Furthermore, we realized that using our past method would not provide enough detail about the quantity and type of trash, which would be less useful for future comparison. Therefore the decision was made not to use the GPS; instead, we counted and categorized all of the trash found in the creek and wrote detailed notes. Following are notes on our methodology:

- The creek was divided into 3 sections for organizational purposes:
  - 1) Reach 1 - Upstream end of RR culvert at W. Figueroa St. to downstream end of culvert below W. Anapamu St.
  - 2) Reach 2 - Upstream end of culvert below W. Anapamu St. to upstream end of oxbow swale in Bohnett Park (including Westside drain tributary)
  - 3) Reach 3 – Upstream side of oxbow swale in Bohnett Park to San Pascual Drain outfall (at garden pond)
- We selected categories for the trash:
  - 1) “Soft” plastic: plastic bags, plastic food wrappers, plastic netting
  - 2) “Hard” plastic: plastic bottles, plastic bottle caps, plastic cups and lids, plastic food containers, other hard plastics
  - 3) Glass bottles
  - 4) Aluminum cans: including tin cans and other small metal containers
  - 5) Bulk trash: larger items that did not fit into any of the other categories, including car batteries, shopping carts, metal pipes, etc.
  - 6) Styrofoam
  - 7) Toys: children’s toys, balls, other sporting equipment
  - 8) Paper goods: paper plates, newspaper, toilet paper
  - 9) Clothes/fabrics: including hats, shoes, rugs, other fabrics
  - 10) Other: miscellaneous small objects that did not fit into other categories
- We only counted items that were in the creek, and items on the lower bank areas that were clearly carried by higher flows. We did NOT count items on other areas of the banks that had been thrown off bridges, from yards, etc.
- We did not count very small pieces of trash. The smallest items we counted were bottle caps- if it was smaller than that, we did not count it.

2) Storm drain inlets (catch basin boxes) surveys.

Also, a sample of catch basin inlet boxes were photographed before installation during the end of the dry season before the first flushing rains when the buildup of trash is at its greatest in the catch basins.



**Figure 2.** Creek Trash Count Map with Reach Locations.

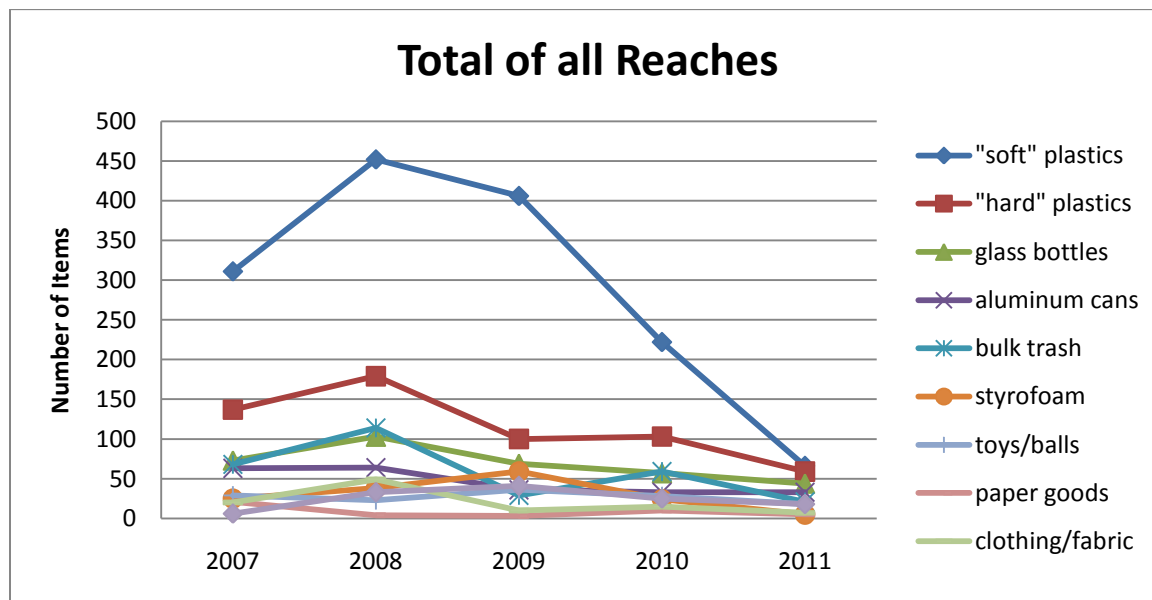
## E. Results

### Old Mission Creek Trash Counts

#### Total of All Reaches

Trash type	2007	2008	2009	2010	2011
"soft" plastics	311	452	406	222	66
"hard" plastics	137	179	100	103	59
glass bottles	73	103	69	57	44
aluminum cans	63	64	36	33	33
bulk trash	68	114	29	59	21
styrofoam	25	38	59	24	5
toys/balls	29	23	36	28	18
paper goods	21	4	3	10	5
clothing/fabric	20	49	10	15	7
other	6	33	41	25	18
Total all items	753	1059	789	576	276

**Table 1.** Results of trash counts from all reaches of Old Mission Creek. 2009 is the first count that took place after screens were installed.

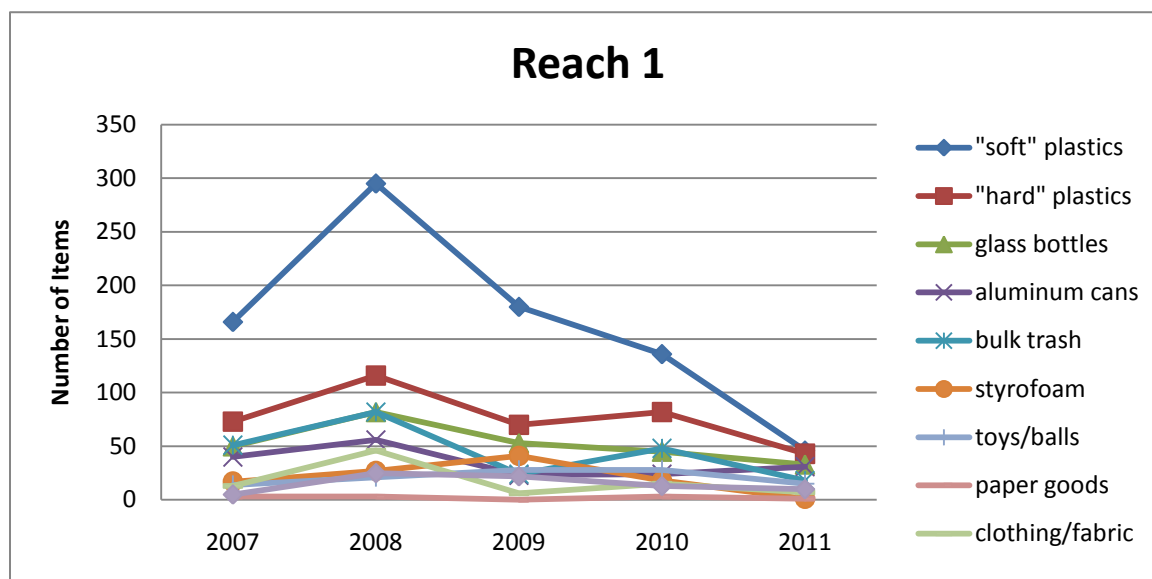


**Figure 3.** Trash Counts for all of Old Mission Creek 2007-2011. 2009 is the first count after screens were installed.

### Reach 1

Trash type	2007	2008	2009	2010	2011
"soft" plastics	166	295	180	136	46
"hard" plastics	73	116	70	82	43
glass bottles	50	82	53	45	33
aluminum cans	40	56	23	24	31
bulk trash	51	82	24	48	18
styrofoam	17	27	41	18	1
toys/balls	14	21	28	28	15
paper goods	3	3	0	3	1
clothing/fabric	13	46	6	15	7
other	5	25	22	13	10
Total all items	432	753	447	412	205

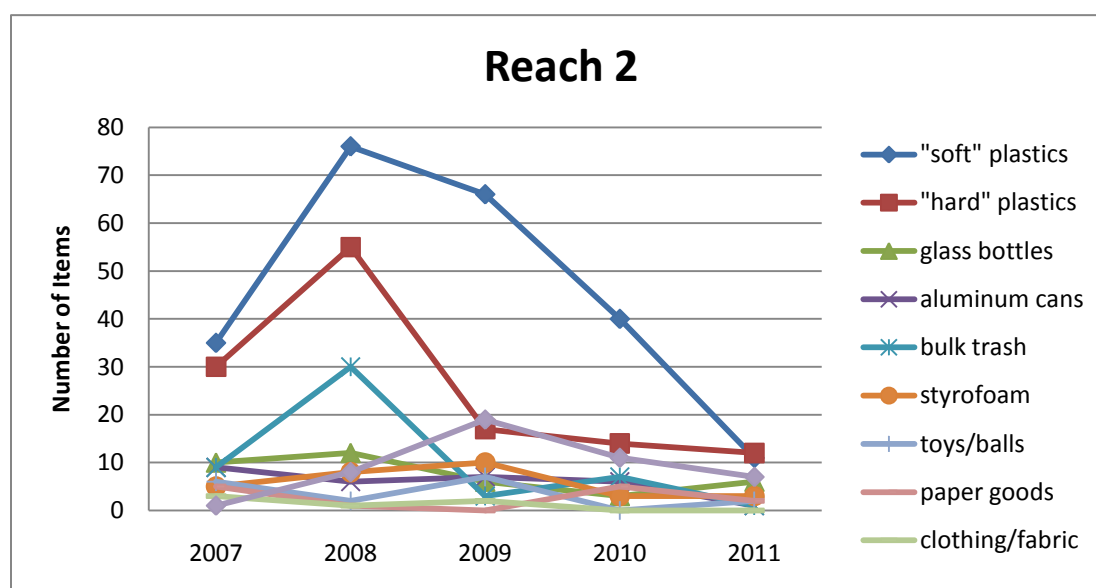
**Table 2.** Results of trash counts from Reach 1 of Old Mission Creek. 2009 is the first count that took place after screens were installed.



**Figure 4.** Trash Counts for Reach 1 of Old Mission Creek 2007-2011. 2009 is the first count that took place after screens were installed.

Reach 2					
Trash type	2007	2008	2009	2010	2011
"soft" plastics	35	76	66	40	11
"hard" plastics	30	55	17	14	12
glass bottles	10	12	6	3	6
aluminum cans	9	6	7	6	1
bulk trash	9	30	3	7	1
styrofoam	5	8	10	3	3
toys/balls	6	2	7	0	2
paper goods	5	1	0	5	2
clothing/fabric	3	1	2	0	0
other	1	8	19	11	7
Total all items	113	199	137	89	45

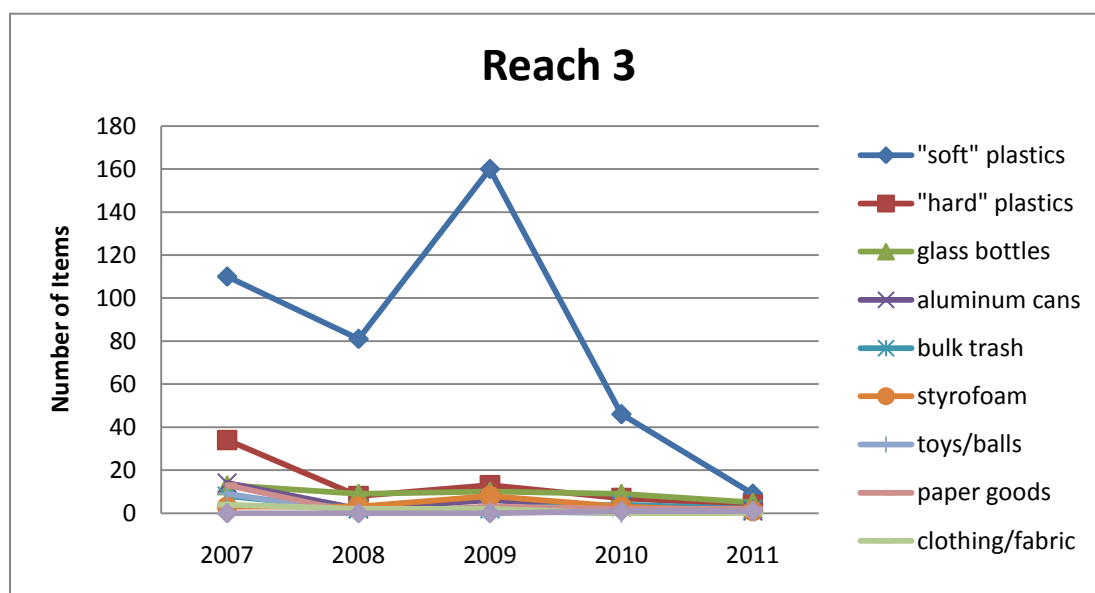
**Table 3.** Results of trash counts from Reach 2 of Old Mission Creek. 2009 is the first count that took place after screens were installed.



**Figure 5.** Trash Counts for Reach 2 of Old Mission Creek 2007-2011. 2009 is the first count that took place after screens were installed.

Reach 3					
Trash type	2007	2008	2009	2010	2011
"soft" plastics	110	81	160	46	9
"hard" plastics	34	8	13	7	4
glass bottles	13	9	10	9	5
aluminum cans	14	2	6	3	1
bulk trash	8	2	2	4	2
styrofoam	3	3	8	3	1
toys/balls	9	0	1	0	1
paper goods	13	0	3	2	2
clothing/fabric	4	2	2	0	0
other	0	0	0	1	1
Total all items	208	107	205	75	26

**Table 4.** Results of trash counts from Reach 3 of Old Mission Creek. 2009 is the first count that took place after screens were installed.



**Figure 6.** Trash Counts for Reach 3 of Old Mission Creek 2007-2011. 2009 is the first count that took place after screens were installed.

#### Interpretation:

- "Soft" plastics, such as plastic bags made up the majority of the trash found in the creek.
- Trash in counted in the creek at the end of each summer was most likely carried from the storm drain inlets during the previous winters' rain events.
- The amount of trash items found in the creek in 2011 was 26% of the amount of trash items found at the peak in 2008, a 74% reduction.
- Each year following project installation shows further reduction of trash. This is likely due to the catch basin screens blocking trash from entering the storm drains and creeks, while the existing trash is cleaned or carried further downstream by each winter's storms.

**Catch Basin Interior Trash Counts**

Catch Basin ID	Year of Trash Count	
	2010	2011
CB-G07-11	1	0
CB-G07-12	1	2
CB-G09-04	29	22
CB-G09-14	65	15
CB-G09-23	33	11
CB-G09-26	28	14
CB-G09-36	0	5
CB-G10-17	29	6
CB-G10-34	24	14
CB-G10-38	13	9
CB-G10-42	5	0
CB-G10-44	6	0
CB-G10-45	8	3
CB-H07-02	17	9
CB-H07-14	21	18
CB-H07-18	39	32
CB-H07-19	10	7
CB-H07-21	7	4
CB-H07-22	13	9
CB-H07-23	14	5
CB-H07-24	3	7
CB-H07-28	6	9
CB-H07-30	0	0
CB-H07-32	18	6
CB-H07-36	5	5
CB-H07-37	1	2
CB-H07-39	3	3
CB-H07-40	0	0
CB-H07-41	3	0
CB-H07-43	12	3
CB-H07-44	3	0
CB-H08-20	22	0
Canon Perdido at Quarantina - SW	0	2
<b>Total trash in all catch basins each year</b>	<b>439</b>	<b>222</b>
Percent Reduction from 2010 to 2011	51%	

**Table 5.** Trash Amounts in selected Catch Basins in 2010 (pre construction) and 2011 (post construction)



**Figure 7.** Counts of Trash greater than 1 inch in size in a sample of catch basins throughout the city. Each line represents a single catch basin where trash was counted over the years.

**Interpretation:**

- After the project, overall trash numbers went down in the catch basin inlets.

## V. Public Outreach

Public outreach for the Catch Basin Inlet Storm Drain Screens Project was directed at Santa Barbara area residents and visitors. In early 2010 a postcard was sent to all City residents (Figure 8) explaining the project and contact information. During Project Construction, project progress was posted on the City of Santa Barbara's website. Updates were also periodically provided to residents through the City Administrator's Report, and the City of Santa Barbara Creeks Division E-news releases.

After project completion, a media release (Figure 9) was sent to all area news organizations. A sign was designed and posted at the Santa Barbara Visitors Center at the corner of Garden Street and Cabrillo Boulevard, across from Stearns Wharf and East Beach. The sign design can be seen in figure 10.

During the spring of 2011, City of Santa Barbara TV highlighted the project during an episode of "Inside Santa Barbara". The segment showed screens being installed and included interviews about the project from the Project Manager and Creeks Division Manager.

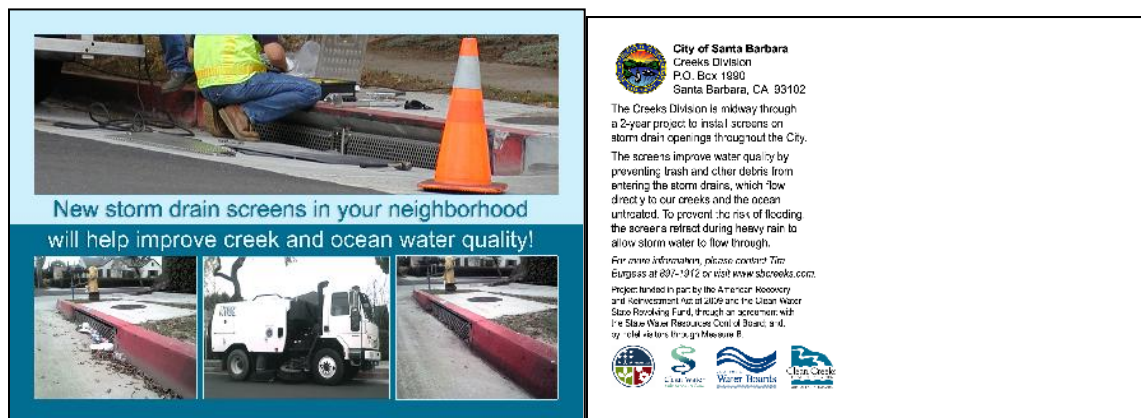


Figure 8. Postcard (front and back) sent to City residents during project construction.



Figure 9. Copy of News Release.



**Figure 10.** Copy of the sign design posted at the City of Santa Barbara Visitors Center.

## VI. Conclusions

The goal of this project was to eliminate the trash and debris transferred from the streets to the storm drains and creeks. Results clearly show a reduction of the amount of trash inside the catch basin inlets, as well as in the creeks.

The Desired Outcomes of this project are:

- i. Reduce the amount of trash in the storm drain catch basin inlets.
- ii. Reduce the amount of trash in the creeks

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Eliminate the trash and debris transferred from the streets to storm drains and creeks.	1. Reduce the amount of trash in the storm drain catch basin inlets. 2. Reduce the amount of trash in the creeks.	1. A reduction in the amount of trash observed in a sample of catch basin inlets. 2. A reduction in the amount of trash observed in the creeks once screens have been installed.	1. The amount of trash observed in a sample of catch basin inlets before and after installation. A 75% reduction of trash in observed inlets is expected. 2. A 50% reduction of trash observed in selected sections of creek before and after installation.	1. Digital Camera to photograph catch basin inlet boxes. 2. Creek walks in selected segments to quantify the amount of trash in the creeks.	1. A 75% reduction of trash in catch basin boxes. 2. A 50% reduction in the amount of trash in the creeks.

**Table 6.** Project Performance Measures for Pollutant Load Reduction Activities:

The target reduction of trash in the selected Catch Basin Inlets between pre project and post project surveys was 75%. The actual reduction was 51%. This is a significant reduction, however it is below target. The trash found in the catch basin inlets after project construction may be from small or flat pieces of trash slipping underneath the catch basin screens during dry weather and from trash being deposited during rain events.

The target reduction of trash in the creeks between pre project and post project surveys was 50%. The 2007 and 2008 trash counts from surveys in Old Mission Creek represent pre project counts of trash. The comparison of trash amounts between 2007 and 2011 show a 63% reduction. The comparison of trash amounts between 2007 and 2011 show a 74% reduction. The target was met and far exceeded for this outcome indicator. Furthermore, the amount of trash in the creek continues to be reduced each year, so we expect further reductions in the amount of trash in future years in the creeks.

Overall, the project has been successful in reducing the amount of trash reaching the creeks through the storm drain system.

The next steps for the Storm Drain Screens Project include continued monitoring to measure the effectiveness of the catch basins screens and to better inform future management decisions. Funding for these activities will be provided by the City and through available grant sources.

**X. Appendices**

- A. List of Items for Submittal
- B. Photos

**Appendix A. List of Items for Submittal**

- 1.1 GPS information for Project site and monitoring locations
- 1.2 Project Assessment and Evaluation Plan (PAEP)
- 1.3 Copy of final CEQA/NEPA Documentation
- 1.4 Landowner Agreement(s)
- 1.5 Applicable Permits
- 1.6 Final storm water treatment device design – Completion of plans and specs for installation of device
- 1.7 Photo documentation of installed screens and interpretive signage
- 1.8 Project construction contract award
- 1.9 Construction start date
- 1.10 Record drawings
- 1.11 Post Construction Monitoring Data and Report
- 1.12 Copy of watershed signage design
- 1.13 Copy of media release
- 1.14 Link to City website with quarterly construction updates
- 1.15 INVOICING
- 1.16 Progress Reports by the twentieth (20<sup>th</sup>) of the month following the end of the calendar quarter (March, June, September, and December)
- 1.17 Annual Project Assessment and Evaluation Plan Report
- 1.18 Annual Project Executive Summary Report
- 1.19 Natural Resource Projects Inventory (NRPI) Project Survey Form
- 1.20 Draft Project Certification
- 1.21 Final Project Certification

## Appendix B. Photos



Installation of storm drain screens in a catch basin



Installed storm drain screen

### CATCH BASIN SCREEN AND STREET SWEEPING COMPATIBILITY



Trash and leaves in front of catch basin screen before street sweeping.



Street sweeping truck passing by catch basin (swept weekly).



Catch basin immediately after street sweeper passed.



Portofino Way and Terni Way



3709 Portofino Way



1034 Palermo Dr. – CB-B08-10



800 Palermo Dr. – CB-B07-16



Modoc Rd – CB-C07-04



Mission Street at State Street – CB-E07-26



Upper Garden Street at Cota Street – CB-G09-33



602 Santa Barbara Street – CB-G09-30



119 E Cota St. – CB-G09-29



Cota St. at Santa Barbara St. – CB-G09-27



1302 State St. – CB-F08-07



1302 State St. – CB-F08-07



1303 State St. – CB-F08-03



1307 State St. – CB-F08-02



State St. at Arlington St. – CB-F08-05



State St. at Arlington St. – CB-F08-05



1316 State St. – CB-F08-06



1332 Anacapa St. – CB-F08-29



Laguna St. at Canon Perdido St. – CB-G08-04



Laguna St. at Canon Perdido St. – CB-G08-04



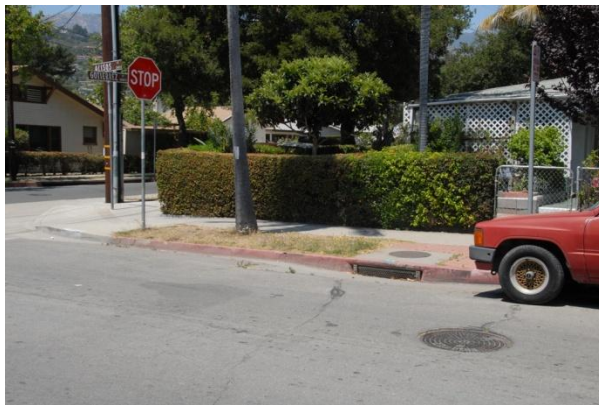
420 N. Alisos St.



410 N. Alisos St.



331 N. Alisos St.



336 N. Alisos St.





1005 E. Montecito St.



East Cabrillo Blvd



Milpas St. at Cabrillo St.



Calle Cesar Chavez St. at E. Cabrillo Blvd. SE Corner



Calle Cesar Chavez St. at E. Cabrillo Blvd. SW Corner



Calle Cezar Chavez St. at RR tracks



Laguna at Ortega, NW



Laguna at Ortega, NW



Laguna at De La Guerra, NE



Laguna at De La Guerra, NW



Ortega at Salsipuedes, NE



500 block of Salsipuedes, E



500 block of Salsipuedes, W



Cota at Salsipuedes, SW



Olive at Cota, NW



500 block of Olive, E



Cota at Laguna, NE



27 East Cota Street – Repaired Catch Basin



432 East Victoria Street – Repaired Catch Basin



1836 Loma Street – Repaired Catch Basin



2000 Emerson Avenue – Repaired Catch Basin



419 East Sola Street – Repaired Catch Basin



1321 Salsipuedes – Repaired Catch Basin



601 East Sola Street – Repaired Catch Basin



CB-E07-05 126 W Islay– Storm Drain Screen installed in repaired catch basin



CB-F06-20 411 E Islay – Storm Drain Screen installed in repaired catch basin



CB-F09-10 326 W De La Guerra— Storm Drain Screen installed in repaired catch basin



CB-G07-13 1321 Salsipuedes— Storm Drain Screen installed in repaired catch basin



CB-G07-15 601 E Sola– Storm Drain Screen installed in repaired catch basin



CB-G07-17 419 E Sola



CB-G07-18 432 E Victoria– Storm Drain Screen installed in repaired catch basin